HIGH SCHOOL AND UNIVERSITY MATRICULATION EXAMINATIONS BOARD.

DEPARTMENTAL EXAMINATIONS, 1929.

TRIGONOMETRY 1.

Time — Three hours.

Values.

6 **1.** (*a*) Find the value of each of the following in terms of the sine of an angle between 0° and 90°

(1) $\text{Cos } 157^\circ\ 16'$, (2) $\text{Sin } 225^\circ\ 50'$,

(3) $\text{Cos } (-38^\circ\ 25')$.

5 (*b*) Find, without tables, the exact numerical value of $\text{Cos } 120^\circ + 3 \text{ Sin } 240^\circ - 2 \text{ Tan } (-135^\circ)$.

6 **2.** (*a*) Without using tables, find the value of

(1) $\text{Cos } 105^\circ$, (2) $\text{Tan } 22^\circ\ 30'$.

6 (*b*) Prove that

$$\text{Sin } (A + B) . \text{Sin}(A - B) = \text{Cos}^2 B - \text{Cos}^2 A.$$

7 (*c*) Prove the formula,

$$\text{Cos } A + \text{Cos } B = 2 \text{ Cos } \frac{A + B}{2} . \text{ Cos } \frac{A - B}{2}$$

3. Attempt *two* parts only.

7 (*a*) Find the general values of θ which satisfy the equation:

$$2 \text{ Sin } \theta \text{ Tan } \theta + 1 = \text{Tan } \theta + 2 \text{ Sin } \theta.$$

7 (*b*) Prove $\text{Tan } 2\theta + \text{Sec} 2\theta = \dfrac{\text{Cos } \theta + \text{Sin } \theta}{\text{Cos } \theta - \text{Sin } \theta}$

7 (*c*) Prove—

$\text{Sin } 2x + \text{Sin } 2y + \text{Sin } 2z = 4 \text{ Sin } x . \text{ Sin } y . \text{ Sin } z$, where x, y and z are the angles of a triangle.

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Values.

9 **4.** (*a*) Prove for any triangle the formula,

$$a^2 = b^2 + c^2 - 2\,bc \text{ Cos } A.$$

7 (*b*) Two sides of a triangle, including an acute angle, are 5 in. and 7 in. respectively, and the area is 14 sq. in. Find the length of the other side.

10 **5.** A surveyor found the elevation of a rock to be 47°. After walking 1000 ft. towards it up a slope inclined at 32° to the horizontal he observes the elevation of the rock to be 77°. Find, without using tables, the vertical height of the rock above the horizontal at the first point of observation, given $\text{Sin } 47° = .731$.

8 **6.** Prove that the area of a triangle is equal to $\dfrac{abc}{4R}$, where a, b and c are the lengths of the sides, and R is the radius of the circumscribed circle.

11 **7.** Solve the triangle for which $a = 671$, $c = 253$ and $B = 50° \, 42'$.

11 **8.** A horizontal line AB is measured 400 yd. long. From a point in AB a balloon ascends vertically until its elevation angles at A and B are 64° 15′ and 48° 20′ respectively. Find the height of the balloon.

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